



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF

MEMORANDUM

DATE: February 8, 2005

SUBJECT: Screening Vapor Intrusion Analysis – Ellsworth Industrial Park, Downers Grove, IL
(Site ID B52A)

FROM: Arunas K. Draugelis, Toxicologist *AKD*

TO: Ross del Rosario, RPM

As per your Memorandum of February 2, 2005, I used the information and data supplied to screen the effects from TCE, PCE and 1,1,1, TCA for vapor intrusion into residential homes. I used the Johnson and Ettinger (J&E) Vapor Intrusion Model, Ground Water-Advanced Version 3.1; 02/04 and have attached the Data Entry Sheets and Results Sheets for TCE, PCE and 1,1,1-TCA.

The results seem to indicate that the incremental risk from these chemicals through the vapor intrusion pathway would be negligible and would not warrant any action from this pathway.

EPA Region 5 Records Ctr.



265609

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

Reset to
Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc below)

YES

ENTER Chemical
groundwater
conc.,
(numbers only,
no dashes)

79016 1.66E+01

ENTER Initial
C_w,
(μ g/L)

Chemical

Trichloroethylene

ENTER Average
soil/
groundwater
temperature,
T_s
(°C)

Depth
below grade
to bottom
of enclosed
space floor,

L_t
(cm)

ENTER Depth
below grade
to water table,

L_{w1}
(cm)

ENTER Thickness
of soil
stratum A,
h_A
(cm)

ENTER Thickness
of soil
stratum B,
h_B
(cm)

ENTER Thickness
of soil
stratum C,
h_C
(cm)

ENTER Soil
stratum
directly above
water table,
(Enter A, B, or C)

ENTER SCS
soil type
directly above
water table

ENTER Soil
stratum A
SCS
soil type
(used to estimate
soil vapor
permeability)

OR

User-defined
stratum A
soil vapor
permeability,
k_v
(cm³)

MORE
↓

ENTER Stratum A
SCS
soil type

Lookup Soil
Parameters

p_b^A
(g/cm³)

ENTER Stratum A
soil dry
bulk density,

n^A
(unitless)

ENTER Stratum A
soil total
porosity,

θ_w^A
(cm³/cm³)

Lookup Soil
Parameters

p_b^B
(g/cm³)

ENTER Stratum B
SCS
soil type

Lookup Soil
Parameters

p_b^B
(g/cm³)

ENTER Stratum B
soil water-filled
porosity,

θ_w^B
(cm³/cm³)

Lookup Soil
Parameters

p_b^C
(g/cm³)

ENTER Stratum C
soil dry
bulk density,

n^C
(unitless)

ENTER Stratum C
soil total
porosity,

θ_w^C
(cm³/cm³)

	1.50	0.430	0.18		1.5	0.43	0.215		1.5	0.43	0.197
--	------	-------	------	--	-----	------	-------	--	-----	------	-------

MORE
↓

ENTER Enclosed
space
floor
thickness,
L_{enc}
(cm)

ENTER Soil-bldg
pressure
differential,
ΔP
(g/cm⁻²)

ENTER Enclosed
space
length,
L_t
(cm)

ENTER Enclosed
space
width,
W_E
(cm)

ENTER Enclosed
space
height,
H_E
(cm)

ENTER Floor-wall
seam crack
width,
w
(cm)

ENTER Indoor
air exchange
rate,
ER
(1/h)

ENTER Average vapor
flow rate into bldg
OR
Leave blank to calculate
Q_{av}
(L/m)

10	40	1000	1000	300	0.1	0.25
----	----	------	------	-----	-----	------

5

MORE
↓

ENTER Averaging
time for
carcinogens,
AT_c
(yrs)

ENTER Averaging
time for
noncarcinogens,
AT_{nc}
(yrs)

ENTER Exposure
duration,
ED
(yrs)

ENTER Exposure
frequency,
EF
(days/yr)

ENTER Target
risk for
carcinogens,
TR
(unitless)

ENTER Target hazard
quotient for
noncarcinogens,
THQ
(unitless)

70	30	30	350	1.0E-06	1
----	----	----	-----	---------	---

Used to calculate risk-based
groundwater concentration

END

RESULTS SHEET

79016/TCE

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

Indoor exposure groundwater conc., carcinogen ($\mu\text{g/L}$)	Indoor exposure groundwater conc., noncarcinogen ($\mu\text{g/L}$)	Risk-based indoor exposure groundwater conc., ($\mu\text{g/L}$)	Pure water solubility, S ($\mu\text{g/L}$)	Final indoor exposure groundwater conc., ($\mu\text{g/L}$)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA	NA	1.47E+06	NA	7.8E-06	4.1E-03

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES
OR

Reset to
Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES

ENTER
Initial
groundwater
conc.
(numbers only,
no dashes)

C_w
($\mu\text{g/L}$)

79016 1.66E+01

Chemical

Trichloroethylene

ENTER
Depth
below grade
to bottom
of enclosed
space/floor,
T_s
(°C)

Average
soil/
groundwater
temperature,
L_r
(cm)

Depth
below grade
to water table,
L_w
(cm)

ENTER
Thickness
of soil
stratum A,
(Enter value or 0)

ENTER
Thickness
of soil
stratum B,
(Enter value or 0)

ENTER
Thickness
of soil
stratum C,
(Enter value or 0)

ENTER
Totals must add up to value of L_w: (cell G28)

r_a
(cm)

h_b
(cm)

h_c
(cm)

ENTER
Soil
stratum
directly above
water table,
(Enter A, B, or C)

ENTER
SCS
soil type
directly above
water table

ENTER
Soil
stratum A
SCS
soil type
(used to estimate
soil vapor
permeability)

ENTER
User-defined
stratum A
soil vapor
permeability,
k_v
(cm^2)

OR

MORE
↓

ENTER
Stratum A
SCS
soil type
Stratum A
soil dry
bulk density,
P_b
(g/cm^3)

ENTER
Stratum A
soil total
porosity,
n^A

ENTER
Stratum A
soil water-filled
porosity,
θ_w

ENTER
Stratum B
SCS
soil type
Stratum B
soil dry
bulk density,
P_b
(g/cm^3)

ENTER
Stratum B
soil total
porosity,
n^B

ENTER
Stratum B
soil water-filled
porosity,
θ_w

ENTER
Stratum C
SCS
soil type
Stratum C
soil dry
bulk density,
P_b
(g/cm^3)

ENTER
Stratum C
soil total
porosity,
n^C

ENTER
Stratum C
soil water-filled
porosity,
θ_w

1.50 0.430 0.18 1.5 0.43 0.215 1.5 0.43 0.187

ENTER
Enclosed
space
floor
thickness,
L_{csc}
(cm)

ENTER
Soil-bldg
pressure
differential,
ΔP
($\text{g}/\text{cm} \cdot \text{s}^2$)

ENTER
Enclosed
space
floor
length,
L_e
(cm)

ENTER
Enclosed
space
floor
width,
W_B
(cm)

ENTER
Floor-wall
seam crack
height,
H_B
(cm)

ENTER
Indoor
air exchange
rate,
ER
(1/h)

ENTER
Average vapor
flow rate into bldg.
OR
Leave blank to calculate
Q_{ext}
(L/m)

10 40 1000 1000 366 0.1 0.25

5

ENTER
Averaging
time for
carcinogens,
AT_C
(yrs)

ENTER
Averaging
time for
noncarcinogens,
AT_{NC}
(yrs)

ENTER
Exposure
duration,
ED
(yrs)

ENTER
Exposure
frequency,
EF
(days/yr)

ENTER
Target
risk for
carcinogens,
TR
(unitless)

ENTER
Target hazard
quotient for
noncarcinogens,
THQ
(unitless)

70 30 30 350 1.0E-06 1

Used to calculate risk-based
groundwater concentration

END

RESULTS SHEET

79016 / TCE

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

Indoor exposure groundwater conc. carcinogen ($\mu\text{g/L}$)	Indoor exposure groundwater conc., noncarcinogen ($\mu\text{g/L}$)	Risk-based indoor groundwater conc., groundwater ($\mu\text{g/L}$)	Pure water solubility, S ($\mu\text{g/L}$)	Final indoor exposure groundwater conc., ($\mu\text{g/L}$)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.13E+00	4.01E+03	2.13E+00	1.47E+06	2.13E+00	NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

SCROLL
DOWN
TO "END"

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER Initial
Chemical groundwater
CAS No conc.
(numbers only,
no dashes) C_w
($\mu\text{g/L}$)

127184 1.40E+01

Chemical

Tetrachloroethylene

ENTER Depth
Average soil/grounwater
below grade
to bottom
of enclosed
space floor,
temperature,
T_s
(°C)
L_f
(cm)
L_{w1}
(cm)

ENTER Depth
below grade
to water table,
L_{w1}
(cm)

ENTER ENTER ENTER
Totals must add up to value of L_{w1} (cell G28)
Thickness of soil stratum B, stratum C,
of soil stratum A, (Enter value or 0) (Enter value or 0)
h_A h_B h_C
(cm) (cm) (cm)

ENTER Soil stratum directly above water table,
SCS soil type (used to estimate
soil vapor permeability)

ENTER Soil stratum A SCS soil type (used to estimate
soil vapor permeability)
OR User-defined stratum A soil vapor permeability,
k_v (cm³)

10 200 3200

200 1500 1500

C SC

1.00E-06

ENTER Stratum A SCS soil type
Stratum A soil dry bulk density,
Lookup Soil Parameters
n^a
(g/cm³)

ENTER Stratum A SCS soil type
Stratum A soil total porosity,
Lookup Soil Parameters
n^a
(unitless)

ENTER Stratum B SCS soil type
Stratum B soil dry bulk density,
Lookup Soil Parameters
n^b
(g/cm³)

ENTER Stratum B SCS soil type
Stratum B soil total porosity,
n^b
(unitless)

ENTER Stratum C SCS soil type
Stratum C soil dry bulk density,
n^c
(g/cm³)

1.50 0.430 0.18

1.5 0.43 0.215

1.5 0.43 0.197

ENTER Enclosed space floor thickness,
L_{enc}
(cm)
Soil-bldg pressure differential,
ΔP
(g/cm²)

ENTER Enclosed space floor length,
L_f
(cm)

ENTER Enclosed space floor width,
W_B
(cm)

ENTER Floor-wall seam crack height,
H_B
(cm)

ENTER Indoor air exchange rate,
ER
(1/h)

ENTER Average vapor flow rate into bldg.
OR
Leave blank to calculate
Q_{ad}
(L/m)

10 40 1000

1000 366 0.1

0.25

5

ENTER Averaging time for carcinogens, AT_C
(yrs)

ENTER Averaging time for noncarcinogens, AT_N
(yrs)

ENTER Exposure duration, ED
(yrs)

ENTER Target risk for carcinogens, EF
(days/yr)

ENTER Target hazard quotient for noncarcinogens, THQ
(unitless)

70 30 30

350 1.0E-06 1

Used to calculate risk-based groundwater concentration

END

RESULTS SHEET

127184 / PCE

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

Indoor exposure groundwater conc., carcinogen ($\mu\text{g/L}$)	Indoor exposure groundwater conc., noncarcinogen ($\mu\text{g/L}$)	Risk-based indoor exposure groundwater conc.,	Pure water solubility, S	Final indoor exposure groundwater conc.,	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA	NA	2.00E+05	NA	5.2E-07	3.4E-04

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL
DOWN
TO "END"

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES

ENTER
Initial
Chemical
groundwater
CAS No.
(numbers only,
no dashes)
 C_w
($\mu\text{g/L}$)

Chemical

127184 1.40E+01

Tetrachloroethylene

ENTER
Depth
Average
soil/
groundwater
temperature,
 T_s
($^{\circ}\text{C}$)

below grade
to bottom
of enclosed
space floor,

L_f
(cm)

ENTER
Depth
below grade
to water table,
 L_w
(cm)

ENTER
Thickness
of soil
stratum A,
(Enter value or 0)

h_a
(cm)

ENTER
Thickness
of soil
stratum B,
(Enter value or 0)

h_b
(cm)

ENTER
Thickness
of soil
stratum C,
(Enter value or 0)

h_c
(cm)

ENTER
Soil
stratum
directly above
water table,
(Enter A, B, or C)

C

ENTER
SCS
soil type
directly above
water table

SC

ENTER
User-defined
stratum A
soil vapor
permeability,
 K_v
(cm^2)

OR

1.00E-08

10 200 3200

200 1500 1500

C SC

ENTER
Stratum A
SCS
soil type

Lookup Soil
Parameters

ρ_d^A
(g/cm^3)

ENTER
Stratum A
soil dry
bulk density,

n^A

ENTER
Stratum A
soil total
porosity,

θ_w^A
(cm^3/cm^3)

ENTER
Enclosed
space
floor
thickness,
 L_{enc}
(cm)

Soln-bldg
pressure
differential,
 ΔP
($\text{g}/\text{cm} \cdot \text{s}^2$)

ENTER
Enclosed
space
floor
length,
 L_f
(cm)

ENTER
Enclosed
space
floor
width,
 W_B
(cm)

ENTER
Floor-wall
seam crack
height,
 H_B
(cm)

ENTER
Stratum B
soil dry
bulk density,

ρ_d^B
(g/cm^3)

ENTER
Stratum B
soil total
porosity,
 n^B
(cm^3/cm^3)

ENTER
Stratum C
soil dry
bulk density,
 ρ_d^C
(g/cm^3)

1.5 0.430 0.18

1.5 0.430 0.18

1.5 0.430 0.18

1.5 0.430 0.18

1.5 0.430 0.197

ENTER
Indoor
air exchange
rate,
 ER
(1/h)

ENTER
Average vapor
flow rate into bldg.
OR
Leave blank to calculate
 Q_{sol}
(L/m)

5

ENTER
Averaging
time for
carcinogens,
 AT_c
(yrs)

Averaging
time for
noncarcinogens,
 AT_{nc}
(yrs)

ENTER
Exposure
duration,
 ED
(yrs)

ENTER
Exposure
frequency,
 EF
(days/yr)

ENTER
Target
risk for
carcinogens,
 TR
(unitless)

ENTER
Target hazard
quotient for
noncarcinogens,
 THQ
(unitless)

70 30 30

350 1.0E-06 1

Used to calculate risk-based
groundwater concentration

END

RESULTS SHEET

127184 / PCE

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor groundwater conc., groundwater (µg/L)	Pure water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.68E+01	4.07E+04	2.68E+01	2.00E+05	2.68E+01	NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL
DOWN
TO "END"

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

Reset to
Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc below)

YES

ENTER ENTER
Initial
groundwater
conc.
Chemical
CAS No
(numbers only,
no dashes)
 C_w
($\mu\text{g/L}$)

71556 6.30E+00

Chemical

1,1,1-Trichloroethane

ENTER ENTER ENTER
Depth
below grade
to bottom
of enclosed
space floor,

Average
soil/
groundwater
temperature,
 T_s
($^{\circ}\text{C}$)

Depth
below grade
to water table,

L_u
(cm)

ENTER ENTER ENTER
Totals must add up to value of L_{wT} (cell G28)
Thickness
of soil
stratum A,
 h_A
(cm)

Thickness
of soil
stratum B,
 h_B
(cm)

Thickness
of soil
stratum C,
 h_C
(cm)

ENTER ENTER
Soil
stratum
directly above
water table,
(Enter A, B, or C)

SCS
soil type
directly above
water table

ENTER ENTER
User-defined
stratum A
soil vapor
permeability,
 k_v
(cm^3)

OR

ENTER ENTER ENTER
Stratum A
SCS
soil type
soil dry
bulk density,
 p_f^A
(g/cm^3)

Lookup Soil
Parameters

ENTER ENTER ENTER
Stratum A
soil total
porosity,
 n^A
(unitless)

θ_w^A
(cm^3/cm^3)

ENTER ENTER ENTER
Stratum A
soil water-filled
porosity,
 θ_w^A
(cm^3/cm^3)

Lookup Soil
Parameters

ENTER ENTER ENTER
Stratum B
SCS
soil type
soil dry
bulk density,
 p_f^B
(g/cm^3)

ENTER ENTER ENTER
Stratum B
soil total
porosity,
 n^B
(unitless)

θ_w^B
(cm^3/cm^3)

ENTER ENTER ENTER
Stratum C
SCS
soil type
soil dry
bulk density,
 p_f^C
(g/cm^3)

Lookup Soil
Parameters

	1.50	0.430	0.18	1.5	0.43	0.215		1.5	0.43	0.187
--	------	-------	------	-----	------	-------	--	-----	------	-------

ENTER ENTER ENTER
Enclosed
space
floor
thickness,
 L_{crest}
(cm)

Soil-bldg
pressure
differential,
 ΔP
($\text{g}/\text{cm} \cdot \text{s}^2$)

ENTER ENTER ENTER
Enclosed
space
floor
length,
 L_b
(cm)

ENTER ENTER ENTER
Enclosed
space
floor
width,
 W_b
(cm)

Floor-wall
space
height,
 H_b
(cm)

Indoor
air exchange
rate,
ER
(1/h)

ENTER
Average vapor
flow rate into bldg.
OR
Leave blank to calculate
 Q_{ext}
(L/m)

10 40 1000 1000 366 0.1 0.25

5

ENTER ENTER ENTER
Averaging
time for
carcinogens,
 AT_c
(yrs)

Averaging
time for
noncarcinogens,
 AT_{NC}
(yrs)

ENTER ENTER ENTER
Exposure
duration,
 ED
(yrs)

ENTER ENTER ENTER
Exposure
frequency,
 EF
(days/yr)

Target
risk for
carcinogens,
 TR
(unitless)

Target hazard
quotient for
noncarcinogens,
 THQ
(unitless)

70 30 30 350 1.0E-06 1

Used to calculate risk-based
groundwater concentration

END

RESULTS SHEET 71556 / 1,1,1-TCA

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

Indoor exposure groundwater conc., carcinogen ($\mu\text{g/L}$)	Indoor exposure groundwater conc., noncarcinogen ($\mu\text{g/L}$)	Risk-based indoor exposure groundwater conc.,	Pure water solubility, S	Final indoor exposure groundwater conc., ($\mu\text{g/L}$)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA	NA	1.33E+06	NA	NA	4.9E-05

MESSAGE AND ERROR SUMMARY BELOW. (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL
DOWN
TO "END"

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES
OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc below)

YES

ENTER Initial
Chemical groundwater
CAS No. conc.,
(numbers only,
no dashes) C_w
($\mu\text{g/L}$)

71556 6.30E+00

Chemical

1,1,1-Trichloroethane

ENTER ENTER ENTER
Depth Depth
Average below grade below grade
soil/ to bottom of enclosed
groundwater space floor, to water table,
temperature, L_f , L_{w1}
 T_s ($^{\circ}\text{C}$) (cm) (cm)

ENTER ENTER ENTER
Totals must add up to value of L_{w1} (cell G28)
Thickness of soil of soil of soil
of soil stratum B. stratum C.
stratum A, (Enter value or 0) (Enter value or 0)
 h_A h_B h_C
(cm) (cm) (cm)

ENTER ENTER
Soil stratum directly above water table,
stratum SCS soil type directly above water table
(Enter A, B, or C) (Enter A, B, or C)

ENTER ENTER
Soil stratum A SCS soil type (used to estimate
stratum A soil vapor permeability,
SCS soil type directly above water table OR
User-defined stratum A soil vapor permeability,
permeability, k_v (cm^3)

10 200 3200

200 1500 1500

C SC

1.00E-08

ENTER ENTER ENTER
Stratum A Stratum A Stratum A
SCS soil dry soil total soil water-filled
soil type bulk density, porosity,
Lookup Soil ρ_t^A n^A θ_w^A
Parameters (g/cm^3) (unitless) (cm^3/cm^3)

ENTER ENTER ENTER
Stratum B Stratum B Stratum B
SCS soil dry soil total soil water-filled
soil type bulk density, porosity,
Lookup Soil ρ_t^B n^B θ_w^B
Parameters (g/cm^3) (unitless) (cm^3/cm^3)

ENTER ENTER ENTER
Stratum C Stratum C Stratum C
SCS soil dry soil total soil water-filled
soil type bulk density, porosity,
Lookup Soil ρ_t^C n^C θ_w^C
Parameters (g/cm^3) (unitless) (cm^3/cm^3)

1.50 0.430 0.18

1.5 0.43 0.215

1.5 0.43 0.187

ENTER ENTER ENTER
Enclosed space floor length, W_E
space differential, width, H_E
thickness, ΔP (cm) (cm) (cm)

ENTER ENTER ENTER
Enclosed space floor height, w
space differential, width, ER
thickness, W_E (cm) (cm) ($1/\text{h}$)

ENTER
Average vapor flow rate into bldg.
OR
Leave blank to calculate
 Q_{ad} (L/m)

10 40 1000 1000 386 0.1 0.25

5

ENTER ENTER ENTER
Averaging time for carcinogens, noncarcinogens,
AT_C AT_{NC} ED
(yrs) (yrs) (yrs)

ENTER ENTER ENTER
Exposure duration, frequency, target risk for carcinogens,
EF TR THQ
(days/yr) (unitless) (unitless)

70 30 30 350 1.0E-06 1

Used to calculate risk-based groundwater concentration

END

RESULTS SHEET

71556 / 1,1,1-TCA

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

Indoor exposure groundwater conc., carcinogen ($\mu\text{g/L}$)	Indoor exposure groundwater conc., noncarcinogen ($\mu\text{g/L}$)	Risk-based indoor exposure groundwater conc.,	Pure water solubility, S	Final indoor exposure groundwater conc., ($\mu\text{g/L}$)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.27E+05	1.27E+05	1.33E+06	1.27E+05	NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL
DOWN
TO "END"

END